Perishables Markets – Modal Shift - Trends

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WorldACD Market Data
The Netherlands
Lufthansa to terminate its scheduled freighter service from Quito and Bogota

"Once matured, the 'New Silk Road' has the capability to stabilize China's food system by enhancing international trade (Rabobank)

At Delta worldwide cooler facilities are set up to store perishables

Emirates invests heavily in cold storage facilities

Ethiopian Airlines to Build Africa's largest Cargo Terminal to support the Ethiopian fast growing export of agricultural products

Temperature variations are far greater in air freight than sea freight (DHL)

Finnair to build new cargo terminal, it will include special cargo handling Areas for perishable products...

Consolidated Aviation Services sees immediate return on perishable handling investment, recording +400% increase on 2014 for volumes handled first 9 months of 2015 in Miami.
Perishables ("PER") for air freight means predominantly flowers, fish, fruits & veggies and meats.

<table>
<thead>
<tr>
<th>Valuables - VAL</th>
<th>Pharma/Temp - (PIL-TEMP)</th>
<th>Live Animals - AVI</th>
<th>Vulnerables - VUN</th>
<th>Dangerous Goods - DGR</th>
<th>Perishables - PER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Cut) Flowers, Foliage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Other Perishables</td>
</tr>
</tbody>
</table>

Product categories distinguished in WorldACD data:

- Fruits & Vegetables
- Fish & Seafood
- Flowers
- Meat
- Chocolate
- Seeds, Plants
- Dairy, Eggs, Cheese
- Etc...

- Bears
- Beef
- Berries
- Bulbs
- Butter
- Cakes, Candy
- Cheese
- Chocolate
- Clams, Oysters, Scallops, Cockles
- Crustacean
- Dairy Products
- Dry Ice
- Eggs
- Fish & Seafood
- Flower and plant
- Frozen
- Fruits and Vegetables
- Grapes
- Herbs, Leaves
- Keep Cool
- Keep Frozen
- Live Crabs & Lobsters
- Live Seafood
- Meat, Sausages, Poultry etc
- Orchids
- Poultry
- Prawns
- Seeds, Bulbs
- Shrimps & Prawns
- Tomatoes
- Tuna
Strong correlation: income growth <-> PER food import

Growth of food perishables import per capita (2000 to 2014) CAGR

Size of bubble represents value of PER food import in 2014

80% of worldwide PER food is imported by developed countries

Source: United Nations and Worldbank

March 2016
Strong correlation: spend on food <-> PER food import

Value of food perishables import per capita (US$ in 2014)

Source: United Nations and US Dep of Agriculture
Income growth coupled with population growth will lead to increased PER demand in India and China

Source: United Nations and IMF
Developed countries spend more on fresh food

Figures per capita in US$ in 2014:

- **Fresh food spend**
- **PER food import value**
- **General food spend**

<table>
<thead>
<tr>
<th>Country</th>
<th>Fresh food spend</th>
<th>PER food import value</th>
<th>General food spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switzerland</td>
<td>1,958</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>1,472</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>1,470</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>1,401</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>693</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>676</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>551</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>392</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>351</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: The Nielsen Company, United Nations, and US Dep of Agriculture
Changing shares in global middle class consumption

Shares of global middle class consumption (2000 to 2050)

Middle class = households with USD10-100 daily expenditure p.p. in purchasing power parity terms

Source: OECD Development Centre
World’s largest food retailers keep growing, which provides them with scale for global sourcing of PER

Retail turnover in top-15 countries (trillion US$)

<table>
<thead>
<tr>
<th>Year</th>
<th>Turnover (trillion US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>5,936</td>
</tr>
<tr>
<td>2020</td>
<td>7,956</td>
</tr>
</tbody>
</table>

Retail turnover expected to grow at CAGR of 6.0% between 2015 and 2020

Almost 70% of absolute growth is expected to be realized in developing countries

Groceries logistics market expected to grow at CAGR of 5.5% in same period

Source: Institute of Grocery Distribution and Technavio

March 2016
Top-10 origins for perishables-by-air

Top-10 countries based on perishable volume – 2015

1. Kenya (1)
2. India (3)
3. USA Pacific States (2)
4. Australia (4)
5. Netherlands (8)
6. Egypt (7)
7. Ecuador (5)
8. Colombia (6)
9. Norway (11)
10. Chile (9)

( ) = position in 2014

Source: WorldACD

March 2016
Freighter deployment in PER markets

Percentage of actual weight carried on freighter aircraft

Source: WorldACD flight level data (31 airlines contributing)
Key markets perishables-by-air (top-3 flows per sub-category)

Source: WorldACD

March 2016
Origins with highest and lowest (absolute) growth perishables-by-air

Country rankings based on **absolute** perishable volume **growth** from 2014 to 2015

**Highest growth**
1. Netherlands
2. India
3. Australia
4. Norway
5. Egypt
6. Kenya
7. Pakistan
8. Ecuador
9. South Africa
10. Morocco

**Lowest growth**
1. Argentina
2. UK
3. USA Pacific States
4. Sri Lanka
5. Chile
6. Peru
7. USA North East
8. Brazil
9. Thailand
10. USA Atlantic South

Country name in red denotes country in the world’s top-10 PER-by-air origins

Source: WorldACD

March 2016
Worldwide shares – volume & yield changes

**SHARE of perishable volume last 2 years together**

- Fruits & Vegetables: 47%
- Fish & Seafood: 27%
- Flowers: 17%
- Meat: 9%

**Vol CHANGE 2014 > 2015**

- ALL CARGO: 2%
- Fish & Seafood: 8%
- Flowers: 9%
- Fruits & Vegetables: 12%
- Meat: 6%

*Source: WorldACD*
Perishables (PER) compared to other air products

2015 Yield (in USD)
General Cargo =100

<table>
<thead>
<tr>
<th>Product</th>
<th>Yield 2015</th>
<th>USD Yield DECREASE 2014 &gt; 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Cargo</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>AVI</td>
<td>163</td>
<td>-6%</td>
</tr>
<tr>
<td>DGR</td>
<td>141</td>
<td>-9%</td>
</tr>
<tr>
<td>PER</td>
<td>68</td>
<td>-10%</td>
</tr>
<tr>
<td>PIL/TEMP</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>VAL</td>
<td>269</td>
<td>-9%</td>
</tr>
<tr>
<td>VUN</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>Special</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>All products</td>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>

Source: WorldACD

March 2016
PER yield has dropped less than General Cargo yield over last two years

Index Jan 2014 = 100

Source: Platts/IATA (fuel data) and WorldACD

March 2016
EU perishables market: evolution of export and import

EU perishables total with countries outside EU28 (volumes trade ton)

Source: WorldACD analysis of Eurostat data

NB: CAGR of 6.7%

1) Air portion of PER trade as % of total PER trade (2015)
   - Export: 2.1%
   - Import: 3.4%

2) Average PER commodity value (total of export and import in 2014)
   - Air: eur 4.9 per kg
   - Sea: eur 1.8 per kg
Main markets perishables-by-air to and from Europe

Source: WorldACD

March 2016
Modal shift is best analyzed per individual market

Year-on-year trade growth by mode of transport (2014 to 2015)
For top 10 countries based on perishables weight

Export from Europe

Air transport vs. Sea transport

Air growth > sea growth

Source: WorldACD analysis of Eurostat data
Modal shift is best analyzed per individual market

Year-on-year trade growth by mode of transport (2014 to 2015)
For top 10 countries based on perishables weight

Export from Europe
Air transport

Sea transport

Air growth > sea growth

Qatar  Saudi Arabia  USA  China  UAE  Japan  Taiwan
Hong Kong  Singapore

Import to Europe
Air transport

Sea transport

Air growth > sea growth

Ethiopia  India  Kenya  South Africa  Ecuador  Colombia  Egypt  Brazil  Peru  USA

Source: WorldACD analysis of Eurostat data
March 2016
Modal shift in key perishables: From Europe TO selected countries

Air and sea share for selected markets and commodities

Europe to Qatar

<table>
<thead>
<tr>
<th>Year</th>
<th>Flowers &amp; plants</th>
<th>Vegetables</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>80%</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>2015</td>
<td>82%</td>
<td>18%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Europe to UAE

<table>
<thead>
<tr>
<th>Year</th>
<th>Flowers &amp; plants</th>
<th>Vegetables</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>2015</td>
<td>53%</td>
<td>47%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Europe to USA

<table>
<thead>
<tr>
<th>Year</th>
<th>Fish</th>
<th>Vegetables</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>34%</td>
<td>66%</td>
<td>100%</td>
</tr>
<tr>
<td>2015</td>
<td>40%</td>
<td>60%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Europe to Japan

<table>
<thead>
<tr>
<th>Year</th>
<th>Fish</th>
<th>Vegetables</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>64%</td>
<td>36%</td>
<td>100%</td>
</tr>
<tr>
<td>2015</td>
<td>60%</td>
<td>40%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: WorldACD analysis of Eurostat data

March 2016
Modal shift in key perishables: From selected countries TO Europe

Air and sea share for selected markets and commodities

**Ethiopia to Europe**
- 2014: 100% (Air)
- 2015: 0% (Sea)

**India to Europe**
- 2014: 21% (Air), 79% (Sea)
- 2015: 23% (Air), 77% (Sea)

**Peru to Europe**
- 2014: 54% (Air), 46% (Sea)
- 2015: 57% (Air), 43% (Sea)

**Brazil to Europe**
- 2014: 90% (Air), 10% (Sea)
- 2015: 91% (Air), 9% (Sea)

\[ \text{Δ in air share} = +2\% \quad \text{Δ in air share} = +3\% \quad \text{Δ in air share} = -1\% \]

Source: WorldACD analysis of Eurostat data
Main markets perishables-by-air to Japan

Source: WorldACD

Inbound Japan

1. USA
2. Malaysia
3. Australia
Modal shift in key perishables: USA TO Japan

Key PER commodities ranked by 2015 air volume (tons)

Source: WorldACD analysis of Japan customs data
Modal shift in key perishables: Australia TO Japan

Key PER commodities ranked by 2015 air volume (tons)

Source: WorldACD analysis of Japan customs data

March 2016
Modal shift in key perishables: Malaysia TO Japan

Key PER commodities ranked by 2015 air volume (tons)

Source: WorldACD analysis of Japan customs data

Δ = +4.7%

Δ = no change

Cut Flowers

Plants without flowers
Areas likely to experience water stress in 2050

Source: Center for Sustainability and the Global Environment
Climate change vulnerability index 2016

Source: Maplecroft
Future food demand may increase food sourcing outside Asia for Asian countries, given more competition for land use, increased demand and challenges with water.

Source: IFTF
Trends

- Income growth and population growth are shifting the PER trade growth from developed to developing countries.

- Supermarket chains will become bigger facilitating the year round supply of fresh produce, thus supporting international PER trade, also by air.

- Many types of fresh fruit such as different berries and various vegetables are transported by sea already: even with volume growth, it may be a challenge for air cargo to maintain its current volumes.

- Cut flowers and certain fish commodities remain the exceptions, for which air cargo is able to maintain a very high market share.

- Given investments in the air cargo community, there are high hopes for cool chain products to support the bottom line.

- Agriculture land souring by third countries for large countries like China, could further support growth of international PER trade.
PER products by air showed much higher growth than the overall cargo market in 2015.

Growth of PER demand will mostly be seen in developing countries, where regional supply is insufficient.

New long distance PER trade will emerge.

Growing middle classes in emerging countries will play a large role in future PER trade patterns, and therefore in the demand for PER by air.

Modal shift is best analysed per individual market: different results for different markets are observed.
Further Information

**SOURCES USED FOR THIS PRESENTATION:**

- Drewry
- Eurostat
- IFTF
- IMF
- Institute of Grocery Distribution
- Japan Customs
- OECD
- Platts / IATA
- Technavio
- The Nielsen Company
- United Nations
- US Department of Agriculture
- Worldbank

&

**WorldACD databases:**

- *More than 225 million AWB’s*
- *Adding > 2 million AWB’s every month*
- *Monthly inputs of full worldwide AWB-data from over 60 airlines*
- *Data provided cover all sales via all distribution channels as well as direct sales*

**FOR FURTHER INFORMATION:**

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